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UTILITY PATENT APPLICATION TRANSMITTAL (Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))	Attorney Docket No. MS150832.2
	First Inventor or Application Identifier Michael Ginsberg
	Title TRUST LEVEL BASED PLATFORM ACCESS...
	Express Mail Label No. EF142130596US

APPLICATION ELEMENTS See MPEP chapter 600 concerning utility patent application contents.	ADDRESS TO: Assistant Commissioner for Patents Box Patent Application Washington, DC 20231
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1. <input checked="" type="checkbox"/> * Fee Transmittal Form (e.g., PTO/SB/17) (Submit an original and a duplicate for fee processing) 2. <input checked="" type="checkbox"/> Specification [Total Pages 14] (preferred arrangement set forth below) - Descriptive title of the Invention - Cross References to Related Applications - Statement Regarding Fed sponsored R & D - Reference to Microfiche Appendix - Background of the Invention - Brief Summary of the Invention - Brief Description of the Drawings (if filed) - Detailed Description - Claim(s) - Abstract of the Disclosure 3. <input checked="" type="checkbox"/> Drawing(s) (35 U.S.C. 113) [Total Sheets 8] 4. Oath or Declaration [Total Pages 1] a. <input checked="" type="checkbox"/> Newly executed (original or copy) b. <input type="checkbox"/> Copy from a prior application (37 C.F.R. § 1.63(d)) (for continuation/divisional with Box 16 completed) i. <input type="checkbox"/> DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b). * NOTE FOR ITEMS 1 & 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).	5. <input type="checkbox"/> Microfiche Computer Program (Appendix) 6. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary) a. <input type="checkbox"/> Computer Readable Copy b. <input type="checkbox"/> Paper Copy (identical to computer copy) c. <input type="checkbox"/> Statement verifying identity of above copies ACCOMPANYING APPLICATION PARTS 7. <input checked="" type="checkbox"/> Assignment Papers (cover sheet & document(s)) 8. <input type="checkbox"/> 37 C.F.R. § 3.73(b) Statement of Power of Attorney (when there is an assignee) 9. <input type="checkbox"/> English Translation Document (if applicable) 10. <input type="checkbox"/> Information Disclosure Statement (IDS)/PTO-1449 [Copies of IDS Citations] 11. <input type="checkbox"/> Preliminary Amendment 12. <input checked="" type="checkbox"/> Return Receipt Postcard (MPEP 503) (Should be specifically itemized) 13. <input type="checkbox"/> * Small Entity Statement filed in prior application, Statement(s) Status still proper and desired (PTO/SB/09-12) 14. <input type="checkbox"/> Certified Copy of Priority Document(s) (if foreign priority is claimed) 15. <input checked="" type="checkbox"/> Other: Express Mail Certificate
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16. If a **CONTINUING APPLICATION**, check appropriate box, and supply the requisite information below and in a preliminary amendment:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: _____ / _____

Prior application information: Examiner _____ Group / Art Unit: _____

For **CONTINUATION or DIVISIONAL APPS** only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

17. CORRESPONDENCE ADDRESS

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Signature	<i>Himanshu S. Amin</i>	Date	9/27/00

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FEE TRANSMITTAL

Patent fees are subject to annual revision on October 1.
These are the fees effective November 10, 1998.
Small Entity payments must be supported by a small entity statement,
otherwise large entity fees must be paid. See Forms PTO/SB/09-12.
See 37 C.F.R. §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT (\$ 730.00

Complete if Known

Application Number
Filing Date Herewith
First Named Inventor Michael Ginsberg
Examiner Name
Group / Art Unit
Attorney Docket No. MS150832.2

METHOD OF PAYMENT (check one)

1. ☒ The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:

Deposit Account Number 50-1063
Deposit Account Name Amin, Eschweiler & Turocy

☒ Charge Any Additional Fee Required Under 37 C.F.R. §§ 1.16 and 1.17 ☐ Charge the Issue Fee Set in 37 C.F.R. § 1.18 at the Mailing of the Notice of Allowance

2. ☒ Payment Enclosed:
☒ Check ☐ Money Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
101 690	201 345	Utility filing fee	690
106 310	206 155	Design filing fee	
107 480	207 240	Plant filing fee	
108 690	208 345	Reissue filing fee	
114 150	214 75	Provisional filing fee	
SUBTOTAL (1)			(\$ 690.00

2. EXTRA CLAIM FEES

Total Claims	Extra Claims	Fee from below	Fee Paid
20	-20** = 0	0	0
3	-3** = 0	0	0
Multiple Dependent		0	0

**or number previously paid, if greater; For Reissues, see below

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description
103 18	203 9	Claims in excess of 20
102 78	202 39	Independent claims in excess of 3
104 260	204 130	Multiple dependent claim, if not paid
109 78	209 39	** Reissue independent claims over original patent
110 18	210 9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) (\$ -0-

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
105 130	205 65	Surcharge - late filing fee or oath	
127 50	227 25	Surcharge - late provisional filing fee or cover sheet.	
139 130	139 130	Non-English specification	
147 2,520	147 2,520	For filing a request for reexamination	
112 920*	112 920*	Requesting publication of SIR prior to Examiner action	
113 1,840*	113 1,840*	Requesting publication of SIR after Examiner action	
115 110	215 55	Extension for reply within first month	
116 380	216 190	Extension for reply within second month	
117 870	217 435	Extension for reply within third month	
118 1,360	218 680	Extension for reply within fourth month	
128 1,850	228 925	Extension for reply within fifth month	
119 300	219 150	Notice of Appeal	
120 300	220 150	Filing a brief in support of an appeal	
121 260	221 130	Request for oral hearing	
138 1,510	138 1,510	Petition to institute a public use proceeding	
140 110	240 55	Petition to revive - unavoidable	
141 1,210	241 605	Petition to revive - unintentional	
142 1,210	242 605	Utility issue fee (or reissue)	
143 430	243 215	Design issue fee	
144 580	244 290	Plant issue fee	
122 130	122 130	Petitions to the Commissioner	
123 50	123 50	Petitions related to provisional applications	
126 240	126 240	Submission of Information Disclosure Stmt	
581 40	581 40	Recording each patent assignment per property (times number of properties)	40.00
146 760	246 380	Filing a submission after final rejection (37 CFR 1.129(a))	
149 760	249 380	For each additional invention to be examined (37 CFR 1.129(b))	
Other fee (specify)			
Other fee (specify)			

* Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$ 40.00

SUBMITTED BY

Typed or Printed Name Himanshu S. Amin

Signature



Date

9/27/00

Complete (if applicable)

Reg. Number 40,894

Deposit Account User ID 50-1063

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Atty. Docket No. MS150832.2

TRUST LEVEL BASED
PLATFORM ACCESS REGULATION
APPLICATION

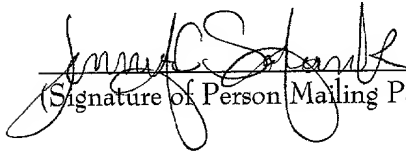
by

Michael Ginsberg

I hereby certify that the attached patent application (along with any other paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on this date September 27, 2000, in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number EF142130596US addressed to the: Box Patent Application, Assistant Commissioner for Patents, Washington, D.C. 20231.

Jennifer C. Safranek

(Typed or Printed Name of Person Mailing Paper)


(Signature of Person Mailing Paper)

Title: Trust Level Based Platform Access Regulation Application

Reference to Related Application

5 This application claims the benefit of U.S. Provisional Patent Application Serial No. 60/208,502, which was filed June 5, 2000, entitled TRUST LEVEL BASED API SERVICES.

Technical Field

10 The present invention relates generally to computer systems. More particularly it relates to regulating access to a computer platform *via* a trust level generator and trust level monitor.

Background of the Invention

15 With the growth of distributed computing it has become common for many applications to seek access to other computers. Manufacturers of distributed computing platforms may want independent software producers to create applications to run on the distributed platform. Creating applications for a distributed platform is facilitated by exposing the internals of the distributed platform to the programming community. Such
20 an exposed platform may be referred to as an open platform.

Although the platform developer may desire an open platform, the platform developer may still desire to restrict access to the platform to trusted applications that perform desired processes with no undesired effects. Conventionally, such access has been regulated by a software application. However, such a software application may
25 itself not be provably trustworthy by the platform. Further, conventional access regulation systems have provided only a binary solution, either granting or denying access. Further still, many conventional access regulation systems generally provided application level verification.

As distributed platforms have become smaller, it has become more common to
30 embed certain programs in the distributed platform. Some embedded programs may be developed and tested by the distributed platform manufacturer and thus may be considered trustworthy. Other embedded programs may have been developed and tested

by third parties and thus may not be considered trustworthy. However, conventional access regulation systems may have treated such programs similarly.

Thus, there is a need for an access regulation system that is provably trustworthy, that can provide greater flexibility than a binary response and that can analyze and
5 interact with a computing environment, rather than simply with stand alone applications.

Summary of the Invention

The present invention provides an operating system component that determines
10 when an application desires access to a distributed platform. One method an application may use to access a platform is *via* one or more application programming interfaces (APIs). The operating system component regulates access to the platform and such regulation may be achieved *via* limiting calls that an application can make through one or more APIs. The present invention further includes a distributed platform trustworthiness
15 analysis application for analyzing applications attempting to access a distributed platform. The analysis application establishes a trust level for the application seeking to access the distributed platform. The trust level determines which calls, if any, to one or more APIs may be permitted. The present invention further includes a component for monitoring the trust level established by the verification program for separate
20 interpretation of the trust level of other modules called by the application that desires access to the distributed platform. The trust level monitoring program thus facilitates interaction with a program and the programming environment in which it is executed.

If a trust level is established for an application seeking access to the distributed platform, that trust level may be examined when the application calls other modules, for
25 example dynamic link libraries. If the dynamic link library has a lower trust level than the application, the dynamic link library may not be permitted to load and thus may be denied access to the distributed platform. Thus, a trusted application may not be compromised by a less trusted library. Conversely, if a “run restricted” application calls a “fully trusted” dynamic link library, the dynamic link library may be treated as though
30 it were “run restricted”, because of its association with the “run restricted” application.

Thus, as illustrated above, the present invention mitigates the problem in conventional systems of a binary response to verification of access to distributed platforms by providing for at least three trust levels for applications. Further, the present invention also mitigates the problems associated with conventional systems concerning analyzing applications individually, without regard to the trust environment. Still further, since the operating system component and the analysis component may be embedded in ROM in the distributed platform, the operating system component and the analysis component may be verifiably trust-worthy, solving yet another problem.

To the accomplishment of the foregoing and related ends, certain illustrative aspects of the invention are described herein in connection with the following description and the annexed drawings. These aspects are indicative, however, of but a few of the various ways in which the principles of the invention may be employed and the present invention is intended to include all such aspects and their equivalents. Other advantages and novel features of the invention may become apparent from the following detailed description of the invention when considered in conjunction with the drawings.

Brief Description of the Drawings

Fig. 1 is a schematic block diagram illustrating the establishment of a trust level for a module in accordance with an aspect of the present invention;

Fig. 2 is a schematic block diagram illustrating a Read Only Memory (ROM) containing an operating system component and a verification component in accordance with an aspect of the present invention;

Fig. 3A is a schematic block diagram illustrating a module's access to a restricted area being limited via a trust level being applied to an Application Programming Interface (API);

Fig. 3B is a schematic block diagram illustrating a module's access to a distributed platform being limited *via* a trust level selectively limiting calls to an API in accordance with an aspect of the present invention;

Fig. 4 is a schematic block diagram illustrating a second module's access to a distributed platform being limited by applying the trust level established for the calling module in accordance with an aspect of the present invention;

Fig. 5 is a table illustrating the interaction between trust levels of modules in accordance with an aspect of the present invention;

Fig. 6 is a flow chart illustrating a method for regulating access to a platform in accordance with an aspect of the present invention; and

5 Fig. 7 is a flow chart illustrating a method for establishing a trust level for a module in accordance with an aspect of the present invention.

Detailed Description of the Invention

The present invention is now described with reference to the drawings, wherein
10 like reference numerals are used to refer to like elements throughout. In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It may be evident,
however, to one skilled in the art that the present invention may be practiced without these specific details. In other instances, well-known structures and devices are shown
15 in block diagram form in order to facilitate description of the present invention.

Fig. 1 is a schematic block diagram illustrating an operating system component 10
for detecting when a module 12 seeks to run on a distributed platform 14. For example,
the operating system component 10 may receive a signal or a command to load the
module 12. If the operating system component 10 determines that the module 12 seeks to
20 run on the distributed platform 14, then the operating system component 10 may transmit
the module 12 to an analyzing component 16 that will establish and store a trust level 18
for the module 12 in accordance with an aspect of the present invention. The analyzing
component 16 may establish, for example, one of three values for the trust level 18 for
the module 12, such as (1) fully trusted, (2) run restricted, and (3) fail to load. For
25 example, the analyzing component 16 may verify a checksum, or may apply an integrity
algorithm to the module 12 to determine whether it should be permitted access to a
restricted area 20 of the distributed platform 14. The trust level 18 may be employed to
restrict the module's 12 access to the restricted area 20 in the distributed platform 14.

For example, a first trust level may allow the module 12 read and write access to
30 the restricted area 20 while a second trust level may allow the module 12 read-only
access to the restricted area 20. Allowing multiple trust levels mitigates the binary

response to verification problems. Conventionally, programs either had complete access or no access. While some programs may not be trustworthy enough to read and write the restricted area 20 of the distributed platform 14, those programs may be trustworthy enough to read the restricted area 20 and thus the multiple trust levels enable improved control of access to the distributed platform 14.

For example, a cellular telephone distributed platform may include an embedded operating system and an embedded analyzing program. The operating system may include a component 10 to determine when a module 13a is trying load onto the cell phone. Before loading the module 13a, the operating system component 10 may transmit the module 13a to the embedded analyzing component 16, which determines whether the module 13a may access the cell phone, and thus whether the module may execute, and if so, with what level of trust. The embedded analyzing component may establish, for example, one of three trust levels for the module, like (1) fully trusted, (2) run restricted, and (3) fail to load. Based on the trust level established, the module 13a, if permitted to load, may be permitted to read and write the restricted areas of the cell phone, or it may only be permitted to read the restricted areas. One such restricted area may be the registry area of the cell phone.

To determine the trust level 18, the analyzing component 16 may utilize one or more trustworthiness verification techniques well known in the art. For example, if a module 13b written by cell phone manufacturer seeks to load onto the cell phone, that program may contain an encrypted key known to the analyzing component 16 and a cyclic redundancy character generated by an algorithm known to the analyzing component 16. The module 13b may be transmitted to the analyzing component 16 that will verify the key and the cyclic redundancy character and establish a "fully trusted" trust level. Further illustrating how a trust level 18 may be established, consider another module 13c, also written by the cell phone manufacturer, that may seek to load onto the cell phone. This module 13c may have been hacked by a third party and thus either the encrypted key or the cyclic redundancy character may not be in a desired state. Thus, the analyzing component 16 may establish a "fail to load" trust level 18. Yet another module 13d, written by a third party, may also seek to load onto the cell phone. The analyzing component 16 may scan the module 13d for viruses or other code that would make the

module 13d not trustworthy. After establishing that the module 13d is not going to compromise the cell phone, the analyzing component 16 may establish a “run restricted” trust level to allow the application to run on the cell phone but not to allow it to alter the internals of the cell phone. Thus, third party applications may be written for the cell phone without compromising the cell phone security, based upon the methods for establishing a trust level 18 described above.

Fig. 2 is a schematic block diagram illustrating a Read Only Memory (ROM) 40 containing an operating system component 42 and an analyzing component 44. By the manufacturer of the distributed platform 14 embedding the operating system component 42 and the analyzing component 44 in the ROM 40, both the operating system component 42 and the analyzing component 44 may be treated as trustworthy by the distributed platform 14. Conventionally, the operating system component 42 was stored in Random Access Memory (RAM), which is vulnerable to corruption. Similarly, the analyzing component 44 was conventionally stored in RAM, similarly subject to corruption. Because the operating system component 42 and the analyzing component 44 were subject to corruption, they were not verifiably trustworthy.

The ROM 40 may also contain a modules section 46 and a files section 48. The modules section 46 may be utilized by the manufacturer of the distributed platform 14 to embed programs that have been pre-analyzed and pre-determined to be fully trustworthy. Similarly, the files section 48 may be utilized by the manufacturer of the distributed platform 14 to embed programs that have not been pre-analyzed and pre-determined to be fully trustworthy yet which the manufacturer desires to have embedded in the distributed platform. Programs placed in the modules section 46 may not be transmitted by the operating system component 42 to the analyzing component 44 as they may be treated as trustworthy by the distributed platform 14. Such programs may automatically have their trust level 50 set to “fully trusted”, for example. Similarly, the ROM 40 may contain the files section 48 which may also contain programs. But the programs in the files section may not be automatically granted a “fully trusted” trust level 50 and thus may be transmitted to the analyzing component 44 because they may not be treated as trustworthy. Embedding the operating system component 42 and the verification

component 44 in the ROM 40 mitigates the problem in the prior art of having a verification component that is not itself verifiably trustworthy.

Fig. 3A is a schematic block diagram illustrating a module 12 having access to a restricted area 52 limited by the application of a trust level 18 to an API 68. The module 12 may make one or more calls that are intended to read and or write the restricted area 52. Some calls may be blocked in the API 68 by the application of the trust level 18. But other calls may not be blocked in the API 68 by the application of the trust level 18 and may thus read and write the restricted area 52. Still other calls may be partially blocked in the API 68 by the application of the trust level 18 and thus may read but not write the restricted area 52.

Fig. 3B is a schematic block diagram illustrating an operating system component 60 limiting a module's 62 access to a distributed platform 64 by applying the trust level 18, established, for example, using the methods described in the description associated with Fig. 1, to selectively limit the module's 62 ability to make calls to an Application Programming Interface (API) 68. A plurality of calls may be directed to the API 68 from the module 62. The calls may include, for example, calls to read and/or write an area in the distributed platform 64, and to perform some logic processing and/or to perform some input/output processing on the distributed platform 64 for example. If a "fully trusted" trust level 66 was established, for example, after the analyzing component 16 (Fig. 1) verified an encrypted keyword and CRC, then all calls from the module 62 to the API 68 may be permitted to access the distributed platform 64. But if a "run restricted" trust level 66 was established, for example, after the analyzing component 16 determined that no viruses were present in a third party module 12, then some calls may selectively be blocked. For example, a call 70A for reading part of a registry 72 of the distributed platform 64 may be permitted while a call 70B for writing to the registry 72 may not be permitted based upon the determined trust level. Similarly, a call 70C may have both reading and writing components and may be partially disabled, allowing the reading functionality to process but not allowing the writing functionality to process. Allowing some calls to complete successfully, while preventing other calls from completing, facilitates multiple levels of trust, thus mitigating the binary access/no-access response problem associated with conventional systems.

Fig. 4 is a schematic block diagram illustrating an operating system component 80 limiting access to a distributed platform 82 by a second module 84 called by a first module 86 by applying a trust level 88 established for the first module 86. As discussed above, the trust level 88 may have been determined by the analyzing component 16 (Fig. 1) applying one or more well known verification algorithms and/or techniques. The first module 86 may be an application with a certain limited functionality. Thus, the first module 86 may rely on one or more second modules 84 to perform additional functionality. Both the first module 86 and the second module 84 may have their own trust level but the trust level 88 of the first module 86 is utilized to determine the relative trust level of the second module 84. Such a relative trust level may differ from the trust level that the second module 84 would have received if it had been analyzed individually. Thus, the second module 84 is analyzed not only by itself but as part of an application environment 90 that includes the context of the first module 86 and its associated trust level 88. Interaction of relative trust levels between modules is illustrated below, in Fig. 5.

Fig. 5 is a table illustrating the interaction between trust levels of an application 100 calling a Dynamic Link Library (DLL) 102 as discussed in the description accompanying Fig. 4. If the application 100 is “fully trusted”, and the DLL 102 is “fully trusted”, then the DLL 102 is treated as “fully trusted”. But if the application 100 is “fully trusted” and the DLL 102 trust level is analyzed to be “run restricted”, then the DLL 102 may not be permitted to load since its lower trust level may compromise the “fully trusted” status of the application 100. Thus, applications with higher trust levels are not corrupted by DLLs with lower trust levels. If the application 100 is “run restricted” and calls the DLL 102 that is “fully trusted”, then the DLL 102 may be downgraded to “run restricted” because of its association with the application 100. Thus, a less trusted application may not be permitted greater access *via* a more trusted DLL.

Fig. 6 is a flow chart illustrating a method for regulating access to a platform. At step 110 a signal is received indicating that a module desires access to a platform. For example, the operating system may receive an interrupt indicating that a module seeks to load and/or the operating system may receive a call intended for an API. At step 112, a determination is made concerning whether the module already has a trust level

established. For example, a module seeking to load for the first time may not have a trust level established because it has not yet been analyzed for trustworthiness while a module already loaded but seeking to make a call *via* an API may have a trust level established because it has already been analyzed for trustworthiness. If the determination at step 112 is that no trust level has been established, then at step 114 the trust level is established. Step 114 is illustrated further in Fig. 7. If the determination at step 112 is that a trust level has been established, then at step 116 a determination is made to determine whether the trust level is high enough to allow the desired access. If the trust level meets or exceeds a pre-determined threshold level, then at step 118, the desired access is permitted. Such a threshold level may be, for example, “fully trusted”. It is to be appreciated by one skilled in the art that different modules may have different threshold levels. For example, the module may be permitted to load, or the call to the API may be permitted to complete. If the trust level does not meet or exceed a pre-determined threshold level, then at step 120 a determination is made concerning whether the module should be terminated. If the module should be terminated, then at step 122 the module is terminated. For example, if the module was trying to write to a part of the platform that only the operating system is permitted to access, then the module may need to be terminated. If the module should not be terminated, then at step 124 the desired functionality is not permitted. For example, the module may not be loaded or the call to the API may not be permitted to complete.

Fig. 7 is a flow chart illustrating a method for establishing a trust level for a module. As discussed above, some modules may be pre-analyzed by the platform developer and thus pre-determined to be fully trustworthy. Such modules may be stored in a section of a ROM on the platform known as a modules section. At step 130 a determination is made whether the module is in the modules section of the ROM. If the module is in the modules section of the ROM, then at step 132 the trust level for the module is set to “fully trusted”. Modules in the modules section of the ROM are located in that section by the manufacturer of the platform to indicate that they should be accorded “fully trusted” status. If the module is not in the modules section of the ROM, then at step 134, the module is transmitted to the analysis program to determine its trust level. At step 136, the results of the analysis are examined. If the analysis determined

that the module should not be loaded, for example if a virus was detected or if destructive code was encountered, then at step 138 a trust level of "load fail" is established, the module is not loaded and the transmitted version is deleted from the process space associated with the analysis program. If the analysis determined that the module should be permitted to load, for example, one or more of the verification algorithms and/or techniques well known in the art indicate that the module is trustworthy, then at step 140 a determination is made whether the module is fully trustworthy. If the module is fully trustworthy, then at step 142 a trust level of "fully trusted" is generated and stored in the process space associated with the module. If the module is not fully trusted, then at step 144 a trust level of "run restricted" is generated and stored in the process associated with the module. Then at step 146, the module is loaded and run, subject to the trust level established.

What has been described above includes examples of the present invention. It is, of course, not possible to describe every conceivable combination of components or methodologies for purposes of describing the present invention, but one of ordinary skill in the art may recognize that many further combinations and permutations of the present invention are possible. Accordingly, the present invention is intended to embrace all such alterations, modifications and variations that fall within the spirit and scope of the appended claims. Furthermore, to the extent that the term "includes" is used in either the detailed description or the claims, such term is intended to be inclusive in a manner similar to the term "comprising."

Claims

What is claimed is:

1. A system for regulating access to a platform comprising:
a component for analyzing a first module and an application environment associated with the first module and determining a level of access to the platform, and applying a trust level to the first module corresponding to the determined level of access.
2. The system of claim 1, the component for analyzing the first module providing for inheritance of the trust level.
3. The system of claim 1, the component for analyzing the first module providing for marking the first module with at least one of states: (1) fully trusted, (2) run restricted, and (3) fail to load.
4. The system of claim 1, wherein the component is stored in a Read Only Memory (ROM) in the platform.
5. The system of claim 1, wherein the component is part of an operating system.
6. The system of claim 1, wherein the trust level is utilized to regulate access to the platform of one or more second modules called by the first module.
7. The system of claim 1, wherein the functionality of one or more Application Programming Interface (API) calls, when called by the first module, are selectively restricted.
8. The system of claim 7, wherein selectively restricting the functionality of the one or more API calls includes restricting the functionality to read functions.

9. The system of claim 8, wherein selectively restricting the functionality of the one or more API calls includes terminating the first module.
10. A system for regulating access to a platform, comprising:
means for determining a trust level for a first module; and
means for applying the trust level to the first module to regulate access to the platform.
11. The system of claim 10 further comprising means for applying the trust level to one or more second modules called by the first module.
12. A method for regulating access to a platform, comprising the steps of:
determining a trust level for a first module; and
applying the trust level to the first module to regulate access to the platform.
13. The method of claim 12 wherein determining the trust level for the first module further comprises the step of marking the first module with at least one of states: (1) fully trusted, (2) run restricted, and (3) fail to load.
14. The method of claim 12 wherein determining the trust level for the first module further comprises transmitting the first module to a verification program.
15. The method of claim 12 wherein regulating access to the platform further comprises selectively aborting calls made to one or more APIs.
16. The method of claim 12 wherein regulating access to the platform further comprises selectively terminating the first module.
17. The method of claim 12 wherein the program for determining the trust level for the first module is stored in a ROM in the platform.

18. The method of claim 12 wherein the logic for applying the trust level to regulate access to the platform is stored in a ROM in the platform.
19. The method of claim 12 wherein the trust level may be inherited.
20. The method of claim 12 wherein the trust level may be applied to one or more second modules called by the first module.

Abstract of the Invention

The present invention provides a system and method for regulating access to a computer platform *via* a provably trustworthy trust level generator and monitor. The present invention comprises an operating system component that recognizes when applications desire access to a distributed platform. The operating system component is responsible for regulating access to the platform. Such regulation may be achieved by, for example, refusing to load the application or by limiting calls that an application can make through one or more Application Programming Interfaces. The present invention further comprises a distributed platform analysis component for analyzing applications attempting to access a distributed platform and for establishing a trust level for the application. The present invention further provides a system and method for monitoring the trust level established by the analysis program for separate interpretation of the trust level of other modules called by the application seeking access to the distributed platform.

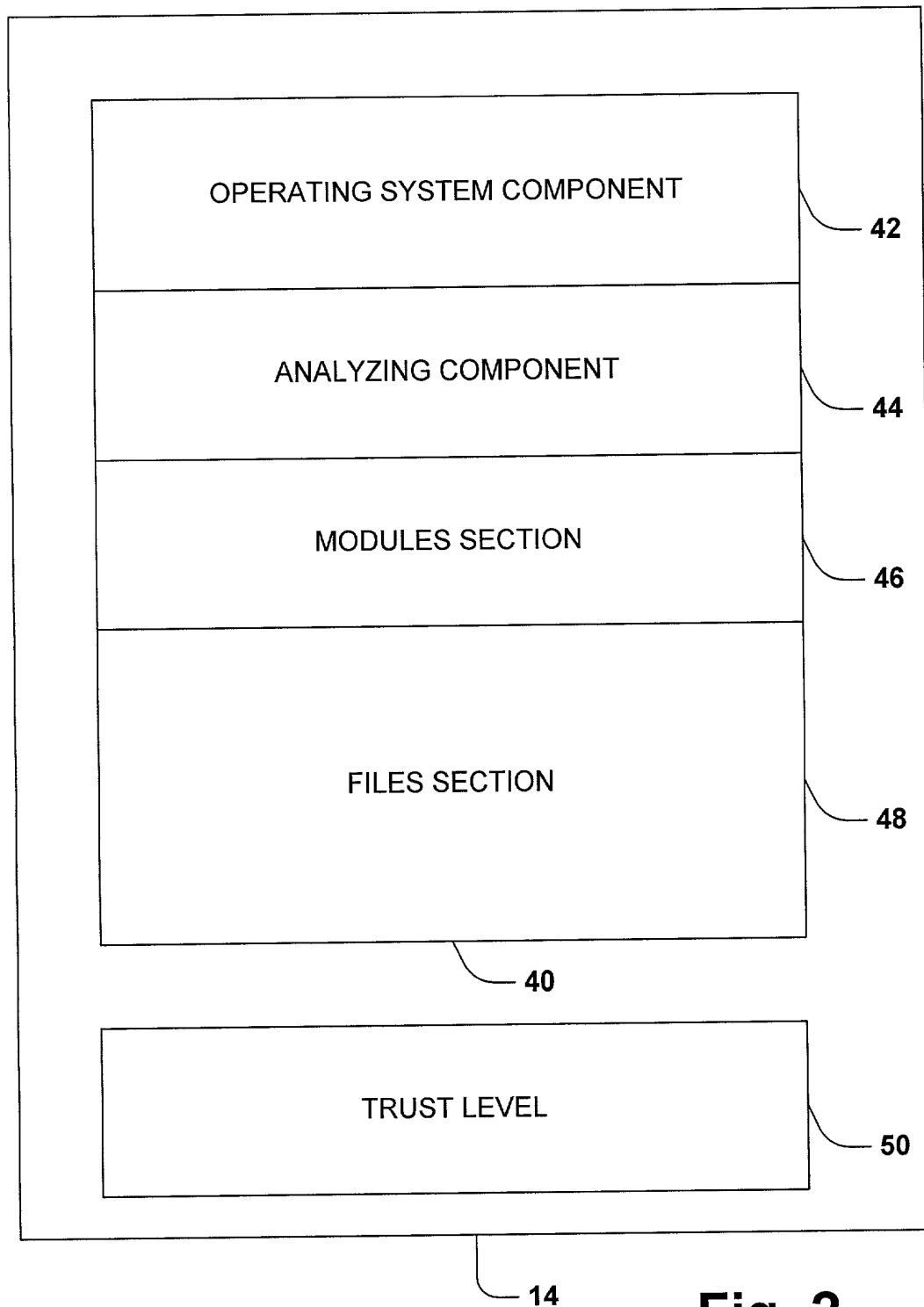


Fig. 2

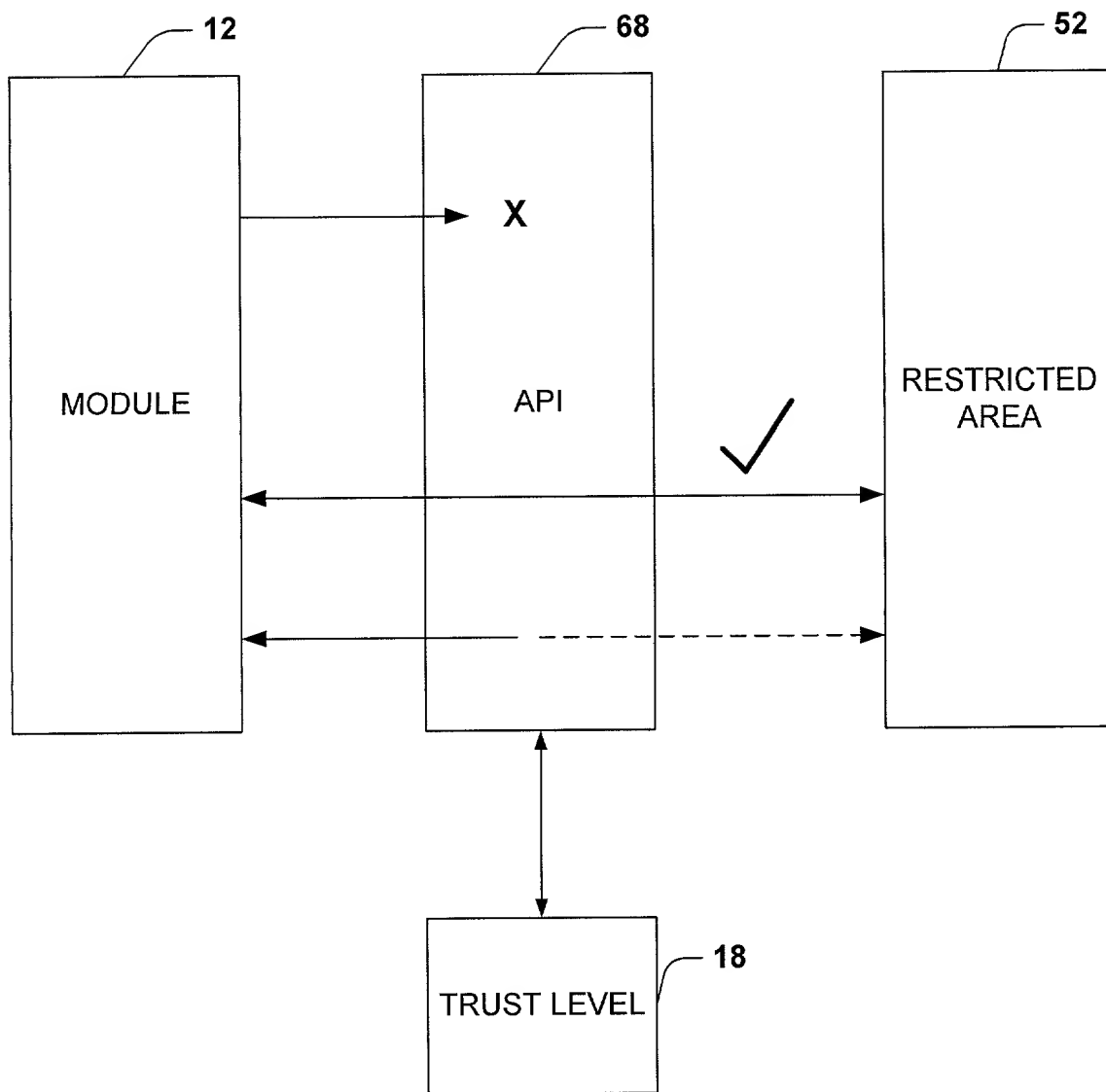


Fig. 3a

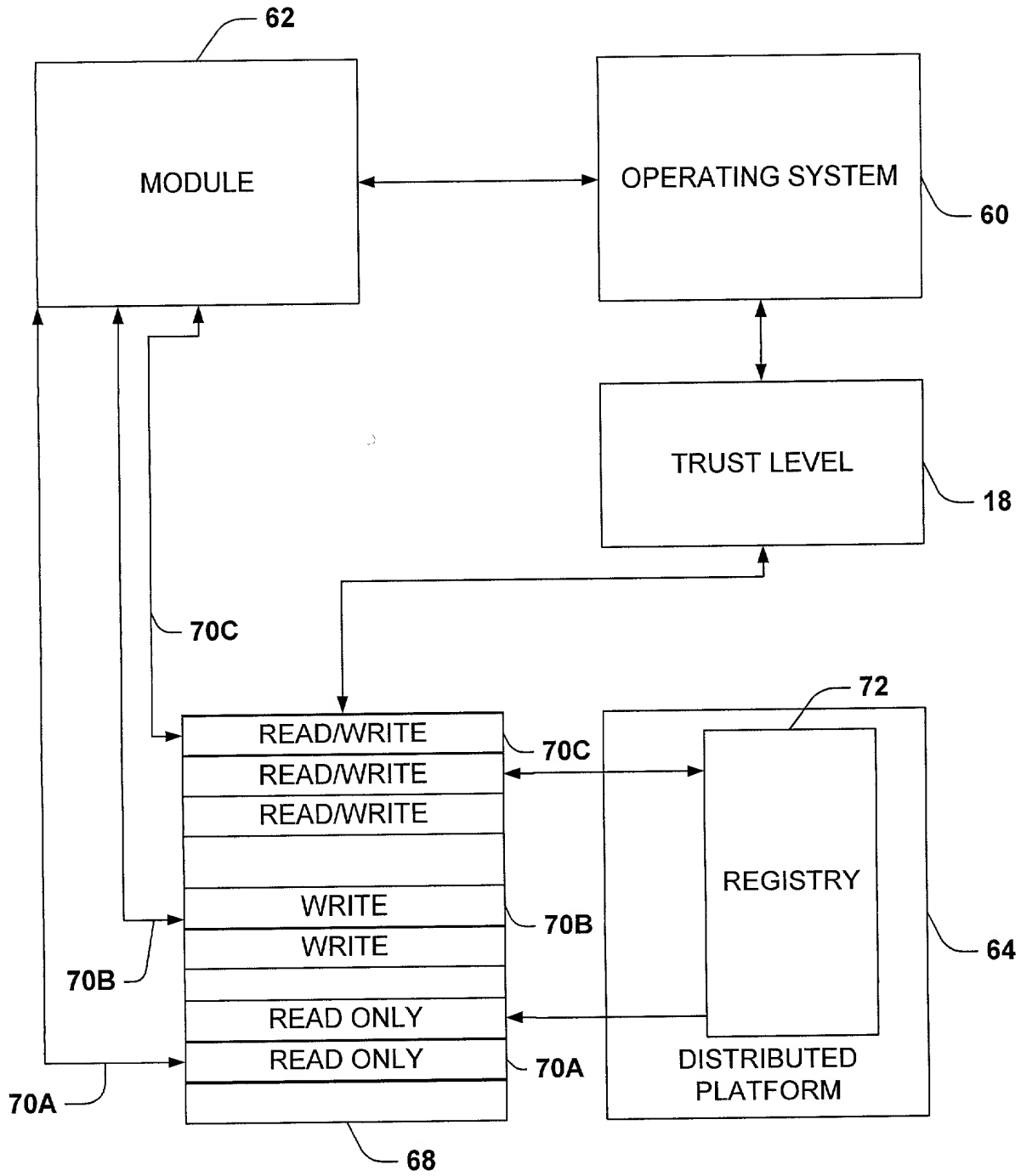


Fig. 3b

```

graph TD
    subgraph 90
        86[MODULE]
        84[DLL]
        86 <--> 84
    end
    86 <--> 80[OPERATING SYSTEM]
    80 <--> 88[TRUST LEVEL]
    88 -.-> 84
    84 --> 82[DISTRIBUTED PLATFORM]
    82 --> 86
    82 --> 88

```

Fig. 4

100

102

		DLL		
		Fully Trusted	Run Restricted	Fail To Load
APPLICATION	Fully Trusted	Fully Trusted	Load Fails	Load Fails
	Run Restricted	Run Restricted	Run Restricted	Load Fails
	Fail To Load	Load Fails	Load Fails	Load Fails

Fig. 5

[illegible]

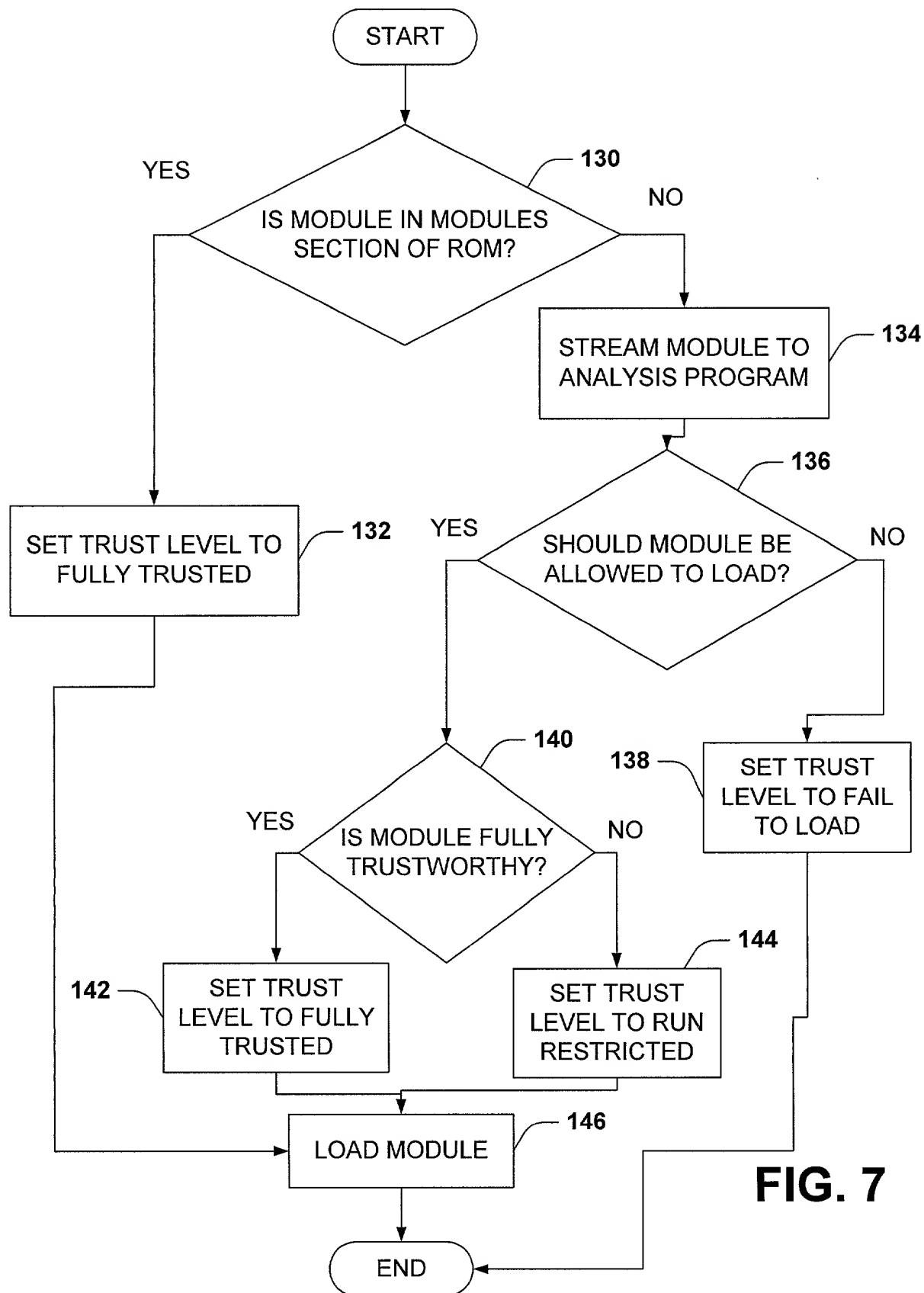


FIG. 7

As a below named inventor, I hereby declare that:

entitled: **TRUST LEVEL BASED PLATFORM ACCESS REGULATION APPLICATION**

the specification of which

- (a) X is attached hereto.
- (b) was filed on as Serial No. 09 / or
Express Mail No. , as Serial No. not yet known, and was amended on
(if applicable).
- (c) was described and claimed in PCT International Application No. filed
on and amended under PCT Article 19 on (if any).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability in accordance with Title 37, Code of Federal Regulations §1.56(a).

I hereby claim priority benefits under Title 35, United States Code, §119 of any provisional application, or any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

- (d) ___ no such applications have been filed.
(e) X such applications have been filed as follows.

**EARLIEST FOREIGN OR PROVISIONAL APPLICATION(S), IF ANY FILED WITHIN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION**

COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35, USC 119
<u>U.S.</u>	<u>60/209,502</u>	<u>June 5, 2000</u>	<u>X</u> Yes <u> </u> No
<u> </u>	<u> </u>	<u> </u>	<u> </u> Yes <u> </u> No
<u> </u>	<u> </u>	<u> </u>	<u> </u> Yes <u> </u> No

**ALL FOREIGN APPLICATION(S), IF ANY FILED MORE THAN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION**

POWER OF ATTORNEY

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (List name and registration number)

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The undersigned to this declaration and power of attorney hereby authorizes the U.S. attorney(s) named herein to accept and follow instructions from:

Name(s) of authorized representative(s) _____
Address _____

as to any actions to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorney(s) and the undersigned. In the event of a change in the person(s) from whom instructions may be taken, the U.S. attorney(s) will be so notified by the undersigned.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued therein.

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Date: 9/21/00 Country of Citizenship: U.S.
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CHECK FOR ANY OF THE FOLLOWING ADDED PAGE(S) WHICH
FORM A PART OF THIS DECLARATION

☒ This declaration ends with this page.